

***Rulingia borealis*, a new combination based on *R. malvifolia* var. *borealis* (Malvaceae s.l. or Sterculiaceae)**

C.F. Wilkins

School of Plant Biology, The University of Western Australia, 35 Stirling Hwy Crawley, Western Australia, 6009

Abstract

Wilkins, C.F. *Rulingia borealis*, a new combination based on *R. malvifolia* var. *borealis* (Malvaceae s.l. or Sterculiaceae). *Nuytsia* 15(3): 517–522 (2005). *Rulingia malvifolia* Steetz is an illegitimate name since Steetz, in describing *R. malvifolia* cited *Commersonia cygnorum* Steud. in synonymy. Pritzl (1901) then described *Rulingia malvifolia* var. *borealis* E.Pritz. This variety is here raised to species rank to become *R. borealis* (E.Pritz.) C.F. Wilkins.

Introduction

No comprehensive treatments of *Rulingia* R.Br. or *Commersonia* J.R.Forst. & G.Forst. have been published since Bentham (1863). There are 23 currently recognised species of *Rulingia* in Australia (Hnatiuk 1990) and one in Madagascar, and 11 species of *Commersonia* in Australia (Hnatiuk 1990) with one of these also occurring in SE Asia and islands of the Indo-Pacific. Twenty-two of the 33 species in the two genera occur in Western Australia. Taxonomic confusion between the two genera was manifested by many species being described as *Rulingia* and then placed in *Commersonia* or vice versa, particularly in Mueller's *Systematic Census of Australian Plants* (1882).

There is doubt as to the validity of separating *Commersonia* and *Rulingia*. *Rulingia* is currently delimited from the earlier described *Commersonia* by having single rather than compound staminodes between the stamens. These genera have recently been shown, by a cladistic analysis of morphological data of the Lasiopetaleae (Wilkins 2002), and studies using *ndhF* molecular data (Whitlock *et al.* 2001), to be paraphyletic. However, only a few species of each genus were included in both analyses and current studies by Wilkins and Whitlock aim to include all species, which would test these results.

Rulingia malvifolia Steetz is one of the species with a history of taxonomic confusion. *Rulingia malvifolia* Steetz is an illegitimate name since Steetz, in describing *R. malvifolia* cited *Commersonia cygnorum* Steud. in synonymy. Steetz described this species in 1848 [as *R. malvaefolia*], basing it on *Commersonia cygnorum* Steud. (1845). In 'Flora Australiensis' Bentham (1863) recorded *C. cygnorum* as a synonym of *R. malvaefolia*, then in 1882, *C. cygnorum* was included by Mueller in his 'Systematic Census of Australian Plants' and *R. malvifolia* was excluded. In 1901 Pritzl incorrectly described *R. malvifolia* var. *borealis* as a variety of *R. malvifolia* rather than of *R. cygnorum*. In 1931 Gardner transferred *C. cygnorum* to *Rulingia* and correctly cited *R. malvifolia* as a synonym. Blackall & Grieve (1956) published a new combination *Rulingia cygnorum* var. *borealis* and cited *Rulingia malvifolia* var. *borealis* in synonymy. This combination was invalid (Article 33.3 ICBN, Greuter *et al.* 2000) as post 1953, a full and direct reference to the author of the basionym and the place of valid publication is required.

Rulingia malvifolia Steetz is incorrectly recorded as a current species in the ‘Census of Australian Vascular Plants’ (Hnatiuk 1990) and its distribution recorded as W – ‘recorded for the Western Australian state but region unknown’. Hnatiuk also includes the current name *Rulingia cygnorum* (Steud.) C. Gardner, but incorrectly lists *R. cygnorum* (Steud.) C. Gardner var. *cygnorum* and *R. cygnorum* var. *borealis* (Steud.) C. Gardner, both of which have never been published.

The Australian Plant Name Index (Australian National Herbarium 2003) gives an accurate list of the three published names and their status. Although validly published, the name *R. malvifolia* var. *borealis* E. Pritz. is not a satisfactory one to use since *R. malvifolia* is illegitimate. In any case this taxon is clearly distinct at the species level and so is raised here to species rank as *Rulingia borealis*.

Methods

Collections from AD, CANB, MEL, NSW and PERTH are included in this study. The species is endemic to WA, has previously been well collected and recently studied across its range by the author. Floral measurements are from re-hydrated herbarium collections and vegetative measurements are from dried specimens. Leaf hair density is defined as ‘scattered’ when the hairs are well separated, ‘medium density’ when the hairs are just touching laterally, ‘dense’ when the hairs are strongly overlapped with the epidermis remaining visible, and ‘tomentose’ where hair density conceals the epidermis. Fruit measurements include the length of the setae on the outer surfaces.

Taxonomy

Key to differentiate *R. borealis* from *R. cygnorum*

1. Staminodes densely hairy on outer surface, mature leaves ovate to broadly-ovate, abaxial leaf surface with scattered to medium density stellate hairs, fruit bristles with stalked, clavate glands along length, grows on granite (Bickley to Cape le Grande) ***R. cygnorum***
1. Staminodes glabrous, mature leaves narrowly-ovate, ovate or oblong, abaxial leaf surface with a dense tomentum of stellate hairs, fruit bristles with stellate hairs along length and glands absent, grows on limestone (Seabird to Shark Bay and Dirk Hartog Island) ***R. borealis***

Rulingia borealis (E. Pritz.) C. F. Wilkins, *comb. et stat. nov.*

Rulingia malvifolia var. *borealis* E. Pritz. in F. L. E. Diels & E. Pritzel, *Botanische Jahrbücher* 35: 369 (6 Dec. 1904); *Rulingia cygnorum* var. *borealis* (E. Pritz.) W. E. Blackall & B. J. Grieve, *How to Know Western Australian Wildflowers*, part 2: 355 (1956), *nom. invalid.*

Typus: ‘District Swan: in collibus calcareis prope mare’, E. Pritzel Pl. Austr. occ. 431, July 1901, *lecto* (here designated); M 0067106; *isolecto* (here designated): AD 98015068, B 100124772, W. *Other material*: ‘Hab. in distr. Irwin pr. Champion Bay in dunis arenoso-calcareis in umbra fruticetorum, D.3198, flor. m. Junio’, *lectopara*: PERTH 01626086.

Illustrations. Blackall & Grieve (1956: 355) and Grieve (1998: 624).

Shrub, clonal stems erect and spreading 0.4–1.5 x 0.4–1.5 m; *young stems* with scattered, short-stalked, white, erect, stellate hairs with pale tan centres 0.5–1.0 mm diam., over a tomentum of sessile, white, stellate hairs 0.2–0.5 mm diam., becoming red-brown or grey, glabrous with longitudinal, fine ridging. *Stipules* persistent, green becoming red-brown, narrowly-lanceolate, irregular margin, 3–5.7 x 0.3–0.7 mm. *Leaf* petiole 1.3–4.5 mm long, hairs as on young stem, base attenuate, blade narrowly-ovate, ovate or oblong, 14–38 x 7–20 mm; adaxial surface with medium density to tomentose, sessile, white, 6-armed, erect, stellate hairs to 0.6 mm diam.; abaxial surface dense to tomentose, sessile, white, 12-armed, erect, stellate hairs 0.6–1.0 mm diam.; margin irregularly crenate, with crenate lobes recurved, apex obtuse. *Inflorescence* a leaf-opposed cyme, 9.8–14 mm long, flowers 7–12. *Bud* base attenuate and apex acute. *Peduncle* 1.5–3 mm long. *Pedicle* 2–5.5 mm long. Peduncle and pedicle with dense, sessile, 12-armed, white, stellate hairs to 0.5 mm diam. *Bract* towards base of pedicle, narrowly-elliptic, green becoming red-brown, 1.8–4 x 0.2–0.3 mm, inner surface with scattered 1–3 armed appressed, hairs, to 0.4 mm long, outer surface with medium density, 1–3 armed, appressed hairs, 0.7 mm long, margin irregular. *Calyx* white, 3.9–6.8 mm long, tube c. 1/4 of total calyx length, lobe ovate, c. 2.9–6.0 x 1.3–2.1 mm, apex acute; adaxial surface base green, centre and margin of lobes with scattered, 1–3 armed, appressed hairs, to 0.15 mm diam.; abaxial surface base with medium density, sessile, stalked, white, erect, stellate hairs to 0.5 mm diam., with dark brown centres, over smaller, sessile, white stellate hairs to 0.2 mm diam., towards apex with similar but scattered stellate hairs. *Petals* glabrous, cream, 3.4–4.7 x 1.0–1.5 mm, base incurved around stamen but not gibbous, ovate; apex a linear yellow or cream ligule 2.7–3.7 x 0.25–0.3 mm. *Staminal tube* glabrous, 0.1–0.3 mm long. *Staminodes* white, glabrous, ovate to narrowly-ovate, 1.7–2.3 x 0.7–0.8 mm. *Filaments* white, glabrous, 0.5–0.8 x 0.1–0.2 mm. *Anthers* dark red, broadly elliptic, c. 0.7 x 0.3 mm, ventri-fixed, latrorse slits. *Ovary* five celled, globose c. 0.6 x 0.7 mm, cells fused laterally with no indentation and fused at the central axis, outer surface green with pre setae outgrowths. *Ovules* 3 per cell. *Styles* five, 0.4–0.5 mm long, glabrous, free at base, fused at prominently capitate stigmas. *Fruit* globose, brown, chartaceous, 4.5–9.0 x 7–11.0 mm, spiky appearance from brown, stiff, setae to 2.8–3.5 mm long, with stiff, white, stellate hairs on apex and scattered along complete length of seta, over dense, soft, white stellate hairs on outer surface of fruit. *Seed* dark brown, glabrous, with longitudinal, fine ridging, 1.3–1.5 x 0.8–0.95 mm. *Aril* a yellow, translucent cap c. 0.7 x 0.7 mm.

Specimens examined. WESTERN AUSTRALIA: Greenough, 20 Jul. 1965, *A.M. Ashby* 1516 (AD, PERTH); Goat Gulch, Kalbarri National Park, 22 July 1998, *D. & B. Bellairs* 5002 (PERTH); Hutt Lagoon, 30 Aug. 1983, *R.J. Cranfield* 3099 (PERTH); 6.5 km N of Arrowsmith Siding along Brand Hwy, 2 July 1992, *R.J. Cranfield & P.J. Spencer* 8264 (CANB, PERTH); Brand Hwy, 0.9 km S of Leeman turnoff, 18 June 1997, *R. Davis* 3354 (PERTH); 9.6 km SSE along Kalis Street from Port Denison, Dongara, alternative route, 18 July 2001, *R. Davis* 9840 (PERTH); WA, *s. dat.*, *WV Fitzgerald* *s.n.* (NSW); Ca. 3.8 km WSW of Louisa Bay Well, Dirk Hartog Island, 4 Sep. 1972, *A.S. George* 11524 (PERTH); Road to Pinnacles, Nambung National Park (Reserve 28393), 1 Nov. 1991, *E.A. Griffin* 6671 (PERTH); Zuytdorp National Park, 1.6 km from coast on track to Zuytdorp wreck site, 18 Aug. 1995, *G.J. Keighery & N. Gibson* 856 (PERTH); Kalbarri National Park, beside old vermin fence on S boundary, 6 Aug. 1996, *G.J. Keighery & N. Gibson* 2071 (MEL, PERTH); 4 km S Seabird 22 June 1992, *G.J. Keighery* 12481 (PERTH); Steep Point, Shark Bay. Approximately 8.5 km SE of Mt Direction, 22 Sep. 1997, *A. Markey* 1637 (PERTH); Greenough Front Flats (S), Henry Rd E of railway line, Greenough Hamlet, 11 Aug. 1998, *M.H. O'Connor* MOC 0185 (PERTH); 19 miles from Dongara towards Encabba, 22 Sep. 1968, *M.E. Phillips* 1424 (CANB, PERTH); Beekeepers Reserve Collection, 30 July 1985, *R.T. Wills* RTW 629 (PERTH); 800 m from Horrocks Beach on S side of Horrocks Beach Rd, 31 July 2003, *C.F. Wilkins, M. Trudgen, B. Moyle* CW 1675 (PERTH); 20 m from Cliff Head Rd on Indian Ocean Drive, 1 Aug. 2003, *C.F. Wilkins, M. Trudgen, B. Moyle*, CW 1688 (PERTH).

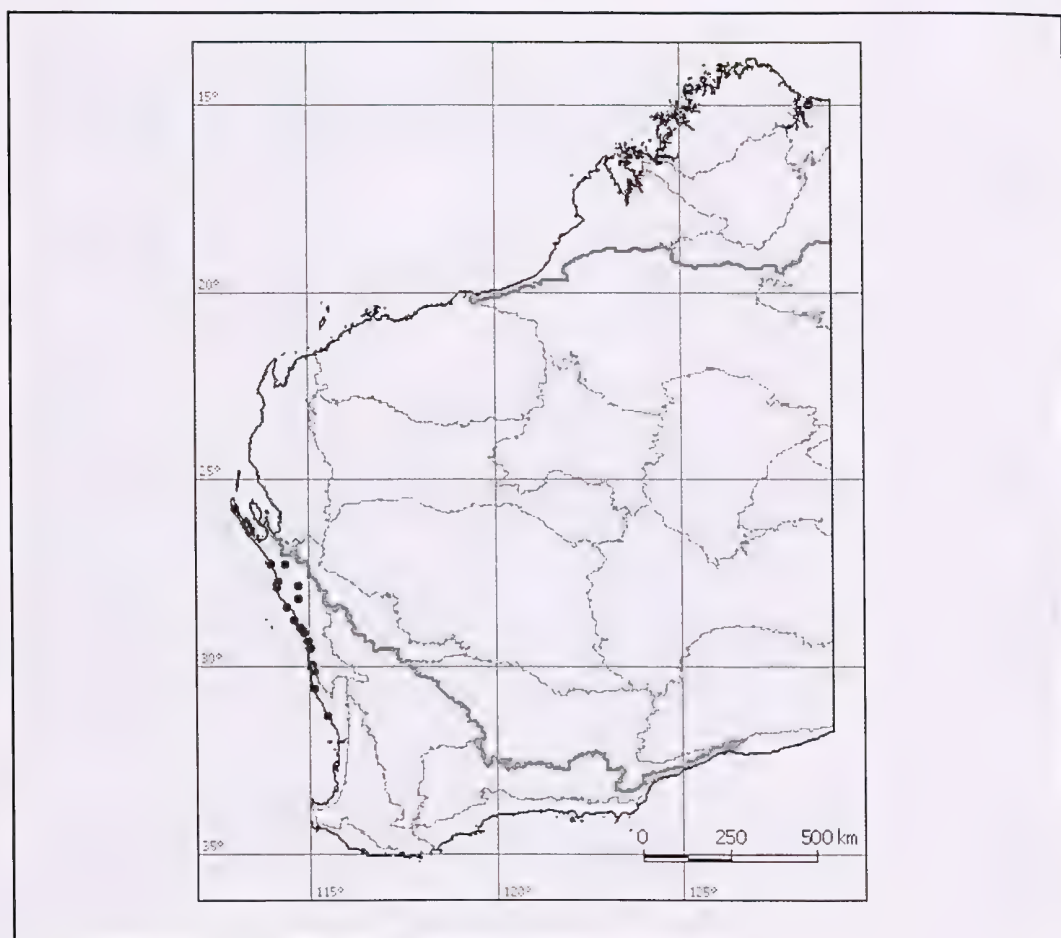


Figure 1. Distribution of *Rulingia borealis* ●.

Distribution. *Rulingia borealis* occurs along the coast north of Perth, from Seabird to Shark Bay and Dirk Hartog Island. (Figure 1)

Habitat. This species grows on yellow to brown calcareous sand or loam over limestone, in coastal shrubland, open woodland or heath.

Flowering period. Flowers from July to November.

Affinity. *Rulingia borealis* appears to be most closely related to *R. cygnorum*, from which it differs in having staminodes that are glabrous, rather than densely stellate hairy on the outer surface, leaves that are narrowly-ovate, ovate or oblong, rather than ovate or broadly-ovate, and in having the abaxial leaf surface with dense to tomentose stellate hairs, rather than scattered to medium density.

Similarities between these two species include flowers with white, narrowly-ovate calyx lobes with an acute apex and petals with linear ligules that extend as long as, or longer than the apex of the calyx lobes. Another similarity is fruits with stiff dark brown long bristles on the outer surface, however the

bristles of *R. cygnorum* have stalked clavate glands present along their length; these are absent from *R. borealis*.

Conservation status. This species is mainly recorded as frequent in the area of collection and is not considered to be at risk at this time. The plants are, however, clonal and the plant stems in the area may be from a single plant.

Etymology. The species epithet *borealis* refers to the northern distribution of this species.

Typification. Syntypes of *Rulingia malvifolia* var. *borealis*, E.Pritzel Pl. Austr. occ. 431, 'District Swan: in collibus calcareis prope mare, VII 1901' have been viewed as loaned specimens from AD, M and W, and as a digital image on the website of the Berlin herbarium (B). The Botanische Staatssammlung München (M) specimen has been here lectotypified as it has been annotated as determined by Pritzel as *R. malvifolia* var. *borealis*. The other syntype of *Rulingia malvifolia* var. *borealis*, mentioned in the protologue is *L. Diels* 3198, 'Prope Champion Bay in dunis arenoso-calcareis in umbra fruticetorum'. This specimen has been viewed at PERTH. It is labelled as 'ex Museo botanico Berolinensi', however, is here lectoparatype as there is more available material of Pritzel 431.

Steetz cited *Commersonia cygnorum* Steud. in synonymy with *R. malvifolia*. A type specimen of *C. cygnorum*, Preiss 1642, has been traced at Lund herbarium. Although this specimen has not been viewed by the author, the locality of this Preiss collection 'Ad caput fluvii Cygnorum' has been proposed by Marchant (1990) as being from Millendon near Guildford. This habitat would suggest *C. cygnorum* Steud. is the taxon currently determined in herbaria as *R. cygnorum*. This latter species ranges from Helena Valley to Esperance WA in granite habitats while *R. borealis* grows north of Perth on coastal calcareous sand over limestone. *R. borealis* does not match the Drummond collections 72 (BM, W) and 374 (W) which are syntypes for the superfluous *R. malvifolia* nom. illeg. These Drummond type collections match specimens currently accepted in herbaria to be *R. cygnorum*.

Acknowledgements

Thanks are extended to the directors and staff of the herbaria from which loans, images or specialist assistance was received. Sincere thanks to Paul Wilson, Barbara Rye and Alex Chapman for helpful comments on typification and the manuscript, to ABRs for research funding, to the director and staff of PERTH and to the School of Plant Biology at the University of Western Australia for additional assistance and provision of facilities. Fieldwork assistance and companionship from Malcolm Trudgen and Brian Moyle, and collection of material by Cate Tauss, are much appreciated. The excellent photographs of *Rulingia malvifolia* material that were taken by Juliet Wege while at Vienna Herbarium, have been of great assistance to this research project. Provision of the species distribution map by Paul Gioia is much appreciated.

References

- Australian National Herbarium (2003 onwards). Australian Plant Name Index. http://www.anbg.gov.au/cgi_bin/apni
- Bentham G. (1863). Sterculiaceae. *In*: "Flora Australiensis". Vol. 1. (L. Reeve and Co.: London).
- Blackall, W.E. and Grieve, B.J. (1956). Sterculiaceae. *In*: "How to Know Western Australian Wildflowers. Part 2" (University of Western Australia Press: Nedlands, Western Australia).
- Gardner, C.A. (1931). "Enumeratio Plantarum Australiae Occidentalis" Pt.3: 80. Government Printer Western Australia.
- Greuter, W., McNeill, J., Barrie, F.R., Burdet, H.M., Demoulin, V., Filgueiras, T.S., Nicolson, D.H., Silva, P.C., Skog, J.E., Trehane, P., Turland, N.J. and Hawksworth, D.L. (2000). "International Code of Botanical Nomenclature" (Saint Louis Code).
- Grieve B.J. (1998). Sterculiaceae. *In*: "How to Know Western Australian Wildflowers. Part 2" (University of Western Australia Press: Nedlands, Western Australia).
- Hnatiuk R.J. (1990). "Census of Australian Vascular Plants." (Australian Government Publishing Service: Canberra).
- Marchant, N.G. (1990). The Western Australian collecting localities of J.A.L. Preiss. *In*: P.S. Short (ed.) "History of Systematic Botany in Australasia". (Australian Systematic Botany Society Inc.: Victoria).
- Mueller, F. von, (1882). Sterculiaceae. *In*: "Systematic Census of Australian Plants, Suppl. 1-4," (McCarron Bird and Co: Melbourne).
- Pritzel, E. (1901). *In*: Diels, F.L.E. & Pritzel, E. Description of *Rulingia malvifolia* var. *borealis*. *Botanische Jahrbücher* 35: 369.
- Steetz, J., in Lehmann, J.G.C. (1848). Description of *R. malvaefolia*, *Plantae Preissianae*, 2: 356.
- Steudel, E.G. von in Lehmann, J.G.C. (1845). Description of *Commersonia cygnorum*, *Plantae Preissianae*, 1: 237.
- Wilkins, C.F. (2002). *A Systematic Study of Lasiopetaleae (Malvaceae s.l. or Sterculiaceae)*. PhD thesis, The University of Western Australia.
- Whitlock B.A., Bayer, C. and Baum, D.A. (2001). Phylogenetic relationships and floral evolution of the Byttnerioideae ("Sterculiaceae" or Malvaceae *s.l.*) based on sequences of the chloroplast gene, *ndhF*. *Systematic Botany* 26: 420-437.